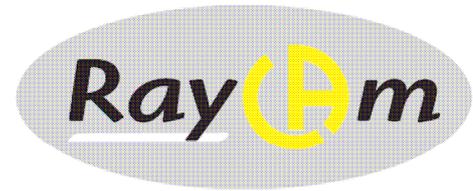


■ Infrared Camera



C.A 1884



ENGLISH

User's Manual

WARNING

A Infrared Camera is a top-quality optical measurement instrument high precious optics and measurement equipment, so you are advised to comply with the following recommendations:

- 1. Do not point the camera at the sun, a welding torch or other high-temperature source**
- 2. Do not use the incorrect temperature measurement range to measure a high-temperature target.**
- 3. When you switch on the camera, please wait for 10-15 minutes before saving your first thermograms to ensure that the camera's temperature has stabilized , thus guaranteeing accurate measurements.**
- 4.  Device which may be sensitive to electrostatic discharges, but only in specific conditions.**

If parts of the camera are burned or damaged or show evidence of problems caused by non-compliance with the instructions above, the manufacturer shall not be liable under any circumstances and any expenses incurred shall be payable entirely by the user.

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FOREWORD

Infrared thermal imaging inspection technology has been available for many years in industrialized countries, where it has become a crucial means of guaranteeing safe industrial production conditions. It is widely used in a whole range of industrial sectors including metallurgy, steel-making, electrical power, the oil industry, automation, natural gas, the transport industry, fire-fighting and border control. For all these activities involving just-in-time operating procedures, high-voltage production equipment, strong electric currents or high operating speeds, thermal imaging offers an ideal no-contact, real-time inspection method.

With this detection method, it is not necessary to cut off the power, shut down the machines or interrupt production. It can be used to diagnose latent malfunctions in advance, thus preventing breakdowns and avoiding production downtime. Infrared detection by thermal imaging is an innovative no-contact assessment technique which is safe, reliable and quick.

Compared with "contact" detection instruments, which are still widely used, this new technology clearly represents a revolution. Infrared thermal imaging inspection technology is used on a large scale in the following fields:

- Monitoring of power equipment and high-voltage transformers
- Fire-fighting and detection of hidden smouldering fire sources
- On the site of a fire, emergency assistance for victims and tactical control
- Location of leaks on thermal equipment and heat exchangers, analysis of heat loss
- Location of thermal faults on rail transport
- Rationalization of circuits by thermal control in the micro-electronics industry
- After-dark monitoring for security departments

This is why infrared detection technology using thermal imaging is unanimously considered the "cutting edge" in industrial monitoring.

1 PRESENTATION OF RayCAM C.A 1884 IR CAMERA

1.1 Overview

The RayCAM C.A 1884 is small, easy to use and equipped with powerful functions. The camera combines particularly advanced detection technology, very sophisticated IR image processing and a user-friendly computer interface. It is one of the advanced portable IR cameras for industrial inspection. Its advantages include:

No need for cooling, optimum reliability, significantly longer service life than cooled thermal imaging systems
Dust-proof, moisture-proof and protected against electromagnetic interference for use in extreme conditions
Small, lightweight and easy to use one-handed
Longer battery life, short charging time and the smart charger clearly indicates the charge status
Advanced electronic circuit to guarantee optimum operation
Attractive, user-friendly Windows-type menu windows
High-resolution colour images captured in real time
Clear images
High thermal sensitivity
Powerful temperature measurement functions
Powerful thermal analysis functions, with spot, line and area temperature analyses performed directly on the equipment
PC Card for image storage: large capacity to keep your images safe

Image processing software called RayCAM *Report* has been specially developed for use with the C.A 1884. The operator can not only view the infrared images but also perform spot, line and area analyses. This ensures greater accuracy when creating the measurement report (including thermal images, photos in the visible spectrum, max., min. and average of the temperatures mapped, line, spot and area analysis, infrared parameters, etc.). This means the operator can aggregate or give details of the analytical results, making the report more specific and dynamic.

1.2 Packaging and Components

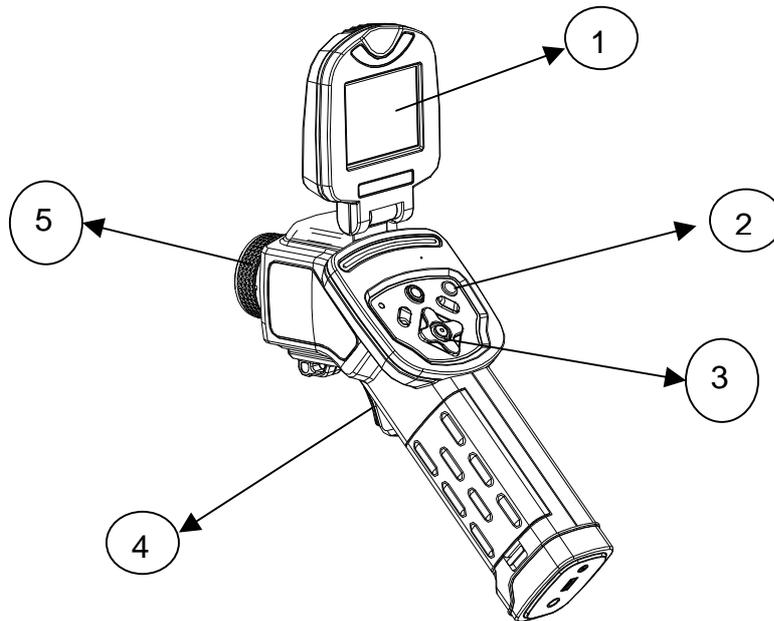
When you receive your RayCAM C.A 1884, please take out all the components from the cardboard box and check against the delivery form. The RayCAM C.A 1884 is delivered in a case containing:

- RayCAM CA 1884 ×1
- Rechargeable lithium battery ×1
- Battery charger ×1
- Video signal output cable ×1
- Video connector ×1
- USB cable ×1
- Lens cap ×1
- User's manual ×1 (CD)
- RayCAM *report* software x1 (CD)

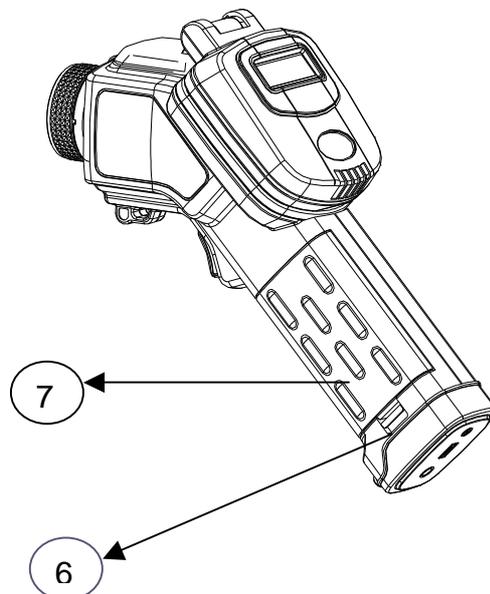
Optional accessories:

- Spare battery
- Mains power supply
- Tripod adapter
- Sunshield x1

2 STRUCTURE OF THE RayCAM C.A 1884



1. LCD SCREEN
2. Power switch
3. Key pad
4. Trigger
5. Manual focus lens



6. Pushkey of battery compartment
7. Cover of battery compartment

3 RayCAm C.A 1884 INTERFACE



- 1. Power supply interface. External 8V DC input
- 2. USB interface. Standard USB connection for PC
- 3. Standard RCA video interface
- 4. Standard RS232 interface (for firmware upgrades only)

4 USE OF THE RayCAM C.A 1884

4.1 Description of Keys



1. Camera ON/OFF switch

Press this button for a few seconds to turn the camera on or off.

2. Power LED

When the camera is switched on, this LED lights up.

3. Control panel

This panel contains:

- “A”: Auto Adjust key
- “C”: Cancel / correction key
- “S”: Freeze/live key / Image back-up key
- Menu (enter) key and 4 direction keys

“A”: Auto Adjust key

This key automatically adjusts the brightness (Span) and the contrast (Level) or the scale, based on the temperature range of the target. This can be repeated several times to achieve the optimum observation conditions.

“C”: Cancel key

In MENU mode, press this key to return to the previous submenu; continue pressing “C” until the screen returns to Non-Menu mode. This key will not save the prior operations on the submenus. In analysis mode (spot or isotherm tool), if you press the “C” key, it will cancel the current tool.

"S": Freeze/live key, save

Use this key to freeze an image or to return to the live image. If you keep pressing the key for more than 3 seconds, the current IR image is saved.

"⏻": Menu (enter) key

Press this key to display the system menu, to open a submenu or to confirm a selection.

In menu mode, you can use the "⬆" or "⬇" keys to move around within a menu. You can also use the "⬆" or "⬇" keys to select the required option. Press the Menu (enter ⏻) key to confirm the selection.

"◀", "▶", "⬆" et "⬇": Direction keys

The keys can be used to move Left, Right, Up and Down, respectively. They are used to select options in a menu, to move the cursors in Analysis mode, to select and set the menu parameters and to zoom in or out on the areas analysed (see Chapter 5).

In addition, in Non-Menu mode, as well as using the "A" key to automatically adjust the brightness (Span) and contrast (Level), the user can also press the Direction keys to adjust them manually.

⬆ ⬇ for the brightness (Span),
◀ ▶ for the contrast (Level).

4.2 Brief introduction

This paragraph offers a brief introduction to use of the RayCAm C.A 1884.

4.2.1 Observation and Adjustment of Infrared Image

1. Press the On / Off key for a few seconds to turn on the camera
2. Wait until initialization and data loading have been completed.
3. Take off the lens cover and point the camera at the target;
4. Turn the lens manually to adjust the focus;
5. Press the "A" key to adjust the brightness (Span), contrast (Level) and scale automatically;

Note: the noise from the camera when operating is normal.

4.2.2 Analysis of temperature measurement

1. After switching on the camera, press the "MENU (ENTER)" key to display the menu;
2. Press the direction keys ("⬆" or "⬇") to open the "Analysis" submenu ;
3. Press the direction key ("◀" or "▶") to select "Spot 1";
4. Press the MENU (ENTER) key again;
5. Move the camera or move the cursor by means of the direction keys so that it points at the target;
6. The value displayed in the top right-hand corner is the temperature of the target;

7 . Multi-spot measurement is possible by selecting “Spot 2” and “Spot 3”

Note: you will only be able to move cursor 1 if “SP1” is displayed in the status bar (see §5.3).

4.2.3 Storing an infrared image

Solution 1:

Keep the “S” key pressed down for 2-3 seconds to store the image and the annotation

Solution 2:

1. After freezing the image, press the "MENU (ENTER)" key to display the menu ;
2. Use the direction keys \triangle and ∇ to select the "FILE" submenu and then press "ENTER";
3. Select “Save” and press the “MENU (ENTER)” key.

4.2.4 Recalling an infrared image

1. Press the "MENU (ENTER)" key to display the menu;
2. Use the direction keys \triangle and ∇ to select the "FILE" submenu and then press "ENTER";
3. Select “OPEN” and confirm by pressing the “ENTER” key;
4. Use the \blacktriangleleft \blacktriangleright direction keys to scroll through the images.

To open an image directly without scrolling through all the thermograms recorded, press the \triangle and ∇ keys.

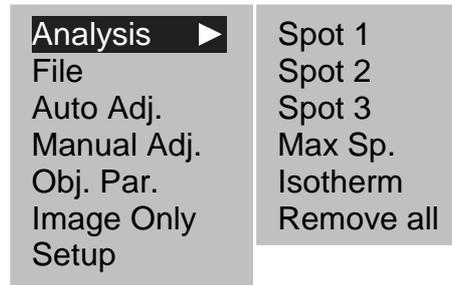
4.3 Menu Items and Functions

The RayCAm C.A 1884 is equipped with a powerful processing and analysis system. It contains seven submenus: “Analysis”, “File”, “Auto-adjustment”, “Manual adjustment”, “Object parameters”, “Image only” and “Setup”.



4.3.1 "Analysis" submenu

Display the menu and select "Analysis". Press the MENU (ENTER) key to open the submenu.



1. Spot 1

Select this item and press the MENU (ENTER) key: the camera will switch to temperature measurement mode. A cross-shaped cursor will appear in the centre of the screen and SP1 will be displayed in the status bar. Move the camera or use the direction keys to point the cursor at the target. The temperature of the target spot will then be displayed in the top right-hand corner of the screen. The "Spot2" and "Spot 3" cursors function in the same way.

2. Max. Sp.: Max / Min temperature

(Choice between max or min temperature: Setup ► Analysis ► Capture spot)

This option can be used to identify and monitor the hottest or coldest spot in an area. The user can change the size of the area by pressing simultaneously on the "left-up", "left-down", "right-up" or "right-down" key combinations. This adjustment is only possible if "CAPT" is displayed in the status bar.

3. Isotherm

Select this option and press the MENU (ENTER) key: the RayCAm will perform isotherm analysis of the infrared image. Objects in the same temperature range will then be displayed in the same colour.

The display mode for the colours and isotherms can be set by selecting:

Setup ► Analysis ► Isother width
Isother colour)

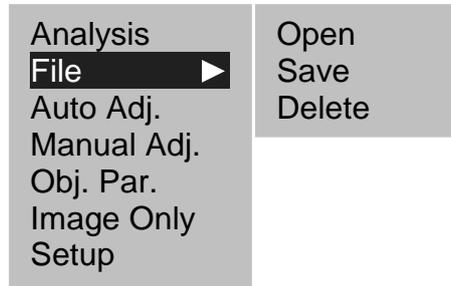
(See § 5.5.3 for more information)

4. Remove all

"Remove all" can be used to delete all the analyses.

4.3.2 "File" submenu

Display the menu and select "File"; then press the MENU (ENTER) key to display the submenu.



1. Open : to open an image file stored on the memory card.
2. Save: to save an IR image on the memory card.
3. Delete: to delete an image file stored on the memory card

4.3.3 "Auto. Adjustment" submenu

Select this item and press the MENU (ENTER) key to adjust the brightness and contrast automatically. The "A" key has the same function.

4.3.4 "Manual Adjustment" submenu

Select this item and press the MENU (ENTER) key to display the bar shown below. Use the \triangle and ∇ keys to change the parameters manually. Use " \blacktriangleleft " or " \blacktriangleright " to move from one parameter to another.

Level 30°C	Span 10°C	Temp. Range -20 -250	Filter Off
---------------	--------------	-------------------------	---------------

Level: this represents the median value of the temperature scale.

Span: this represents the amplitude of the scale, i.e. the difference between the max. temperature and the min. temperature.

Example: in the settings above, the scale of the thermogram is from 25 °C to 35 °C.

Temperature range: "-20°C to +250°C" is the standard measurement range of the RayCam C.A. 1884. If you have a high-temperature camera, press the up or down arrow to change from one temperature range to another (you must not be in freeze mode for this).

4.3.5 "Obj. Par" submenu

Select this item and press the MENU (ENTER) key to display the window shown below. Use the direction keys to change the parameters manually.

Emiss	:	0.95
Distance	:	5m
Amb Temp	:	25.0°C
Humidity	:	50%

Emissivity: property of the material which is essential for correct determination of the target's temperature. Setting between 0 and 1, in increments of 0.01.

Distance: distance between the thermography user and the target. This setting can be adjusted in 1 m increments (only necessary when the user is a long way from the target, i.e. 5 m or more).

Ambient temperature: temperature of the area around the target. This must be set with precision, particularly if there is a heat source close to the target.

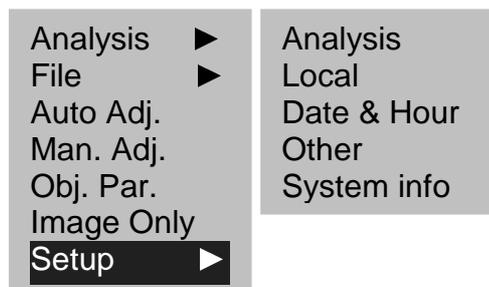
Humidity: this setting concerns the air around the target, adjustable in 1 % increments (to be determined precisely if the user is a long way from the target, i.e. 5 m or more).

4.3.6 "Image Only" submenu

Select this item and press the MENU (ENTER) key to clear the various information from the screen. The screen will then show only the IR image. To redisplay the information, simply press any key.

4.3.7 "Setup" submenu

Select this item and press the MENU (ENTER) key that it will pop up the submenu.



1. Setup ▶ Analysis

Select this item and press the MENU (ENTER) key to display the window shown below. Use the direction keys to change the parameters:

- ◀ or ▶ : to scroll through the options in the submenus
- △ or ▽ : to move from one submenu to another

Capture spot	: Maximum
Alert	: On
Temp alert	: 100°C
Correct temp	: 0°C
Isotherm width:	0.7°C
Isotherm colour:	Green
Isotherm alert	: 50°C
Laser Adjust	: On

(1) Capture Spot

This is for setting the "Max SP" option in the "Analysis" submenu. If you select Maximum, the camera will automatically track the hottest spot. If "Minimum" is chosen, it will automatically track the coldest spot.

(2) Alert

This option is for activating or deactivating the Alarm function. When this function is activated, the heat readings for the Max spot are displayed in red and the camera sounds a buzzer if the value is greater than the threshold programmed. If "Capture Spot" has been configured with Min, the Min spot temperature readings will be displayed in red and the camera sounds a buzzer if the value is less than the threshold programmed.

(3) Temp Alert

This option is used to set the alarm threshold.

(4) Correct Temp

In certain specific conditions, this option can be used to correct the temperature value measured by the camera in order to guarantee accurate measurements. In normal conditions, this option is set to 0 °C.

Example: If the setting is 1 °C, all the temperatures displayed will be increased by 1 °C.

(5) Isotherm Width

This option is used to set the width of the isotherm range for the "Isotherm" function in the ANALYSIS submenu. The width can be set using 0.1 °C increments until the upper limit is reached.

(6) Isotherm colour

This option is used to choose the colour of the isotherm range. Two colours are possible: red or green.

(7) Isotherm Alert

This can be set to a value from 1 to 255, where 1 is the most sensitive and 255 is the least sensitive.

(8) Laser Adjust

This option is used to define the position of the laser pointer image to match spot 1. When it is activated, the user can readjust the position so that it corresponds to the value of spot 1. When this option is deactivated, the laser pointer position will be recorded. See Chapter 5.7 for further details.

2. Setup ► Local

Select this item and press the MENU (ENTER) key to display the window shown below. Use the direction keys to change the settings.

Language	:	French
Video output	:	PAL
Temp unit	:	°C
Dist unit	:	Meter
Date format	:	DD/MM/YY

(1) Language

English, French, Chinese, German, Italian, Spanish and Portuguese are available.

(2) Video output

Choice between PAL and NTSC video output.

(3) Temperature unit

Choice between Celsius and Fahrenheit

(4) Distance unit

Choice between "Metre" and "Foot" are available.

(5) Date format

"DD" is the day, "MM" is the month and "YY" is the year

3. Setup ► Date & Hour

Select this item and press the MENU (ENTER) key to display the window shown below. Use the direction keys to change the date/time settings.

Year	:	2008
Month	:	8
Day	:	5
Hour	:	7
Minute	:	15

4. Setup ▶ Other

Select this item and press the MENU (ENTER) key to display the window shown below. Use the direction keys to change the settings.

Palette	:	Iron
Auto Adjust	:	Level & Span
Continuous Adj	:	Level & Span
Shut down	:	Never
LCD display	:	Never
Shutter period	:	Short
File name	:	
Directory name	:	
Trigger Button	:	Laser on

(1) Palette

This option allows you to choose among a set of pseudocolour schemes. The RayCAM offers 6 colour modes: "Iron", "Iron inverted", "Rainbow", "Feather", "Grey" and "Grey inverted".

(2) Auto Adjust

This option can be used to define the "A" key adjustment mode. Three options are available: "Level & Span", "Level" and "Span". If "Level & Span" is selected, when you press the "A" key, the camera will automatically adjust the brightness and contrast of the image to the default value for image optimization. If "Level" is selected, when you press the "A" key, the camera will automatically adjust the brightness of the image, whereas the contrast will have to be adjusted manually. If "Span" is selected, however, when you press the "A" key, the camera will automatically adjust the contrast of the image, while the brightness will have to be adjusted manually.

(3) Continuous adjust

This is used to define whether the camera should continuously auto-adjust the moving image. There are three options provided: "Level & Span", "Level" and "Off".

If "Level & Span" is selected, the camera will automatically adjust the brightness and contrast of the image continuously as the image changes;

If "Level" is selected, the camera will automatically adjust the brightness of the image continuously as the image changes.

If "Off" is selected, the camera will not automatically adjust the brightness and contrast of the image according to the image changes, so the image display must be adjusted manually or by pressing the "A" key.

(4) Shutdown

To schedule automatic shutdown of the camera. There are 4 selections: "never"/"2min.,"/5min.,"/10min."

(5) LCD Display

This is for programming the automatic screen shutdown (standby) time. 4 selections are available: "never", "30 sec.", "60 sec.", "2 min.". The screen can be reactivated by pressing any key.

(6) Shutter Period

For programming the periodicity of the auto-adjust function. 2 selections are available: "normal" and "short". With the "normal" setting, the camera auto-adjusts every 2 minutes. With the "short" setting, it performs an auto-adjustment once per minute.

This shows the name of the current file. It is not necessary for the user to change this file name. In NULL mode, press simultaneously on "C" + "A" + "S" to reset the file name to CA00000

(7) Directory Name

This shows the current Directory name. The user can change this name and the camera will then create a new DIR name and use it when saving images.

(8) Trigger Button

The user can choose between several settings:

- i. "Laser on" : the laser function will be activated to detect the target (when the trigger button is pressed)
- ii. "None" : the trigger button will be deactivated ;
- iii. "Save" : the trigger button will offer the same functions as the "S" key ;
- iv. "Auto Adjust" : the trigger button will offer the same functions as the "A" key ;

5. System Information

Select this item and press the MENU (ENTER) key to display the information window. This window contains general information: serial number, production date and software version.

5 RayCAM C.A 1884: EXAMPLES OF TYPICAL OPERATIONS

5.1 Inserting the Battery

When the RayCAM C.A 1884 IR camera is used for the first time, the battery may not be sufficiently charged. The battery can be recharged with the special charger.

- (1) Inserting the battery : keep the pushkey pressed down and remove the battery compartment cover. Place the battery in the compartment and push it until it comes into contact with the bottom of the compartment. Then close the compartment cover.
- (2) Removing the battery : remove the cover and pull out the battery.

5.2 Start-up

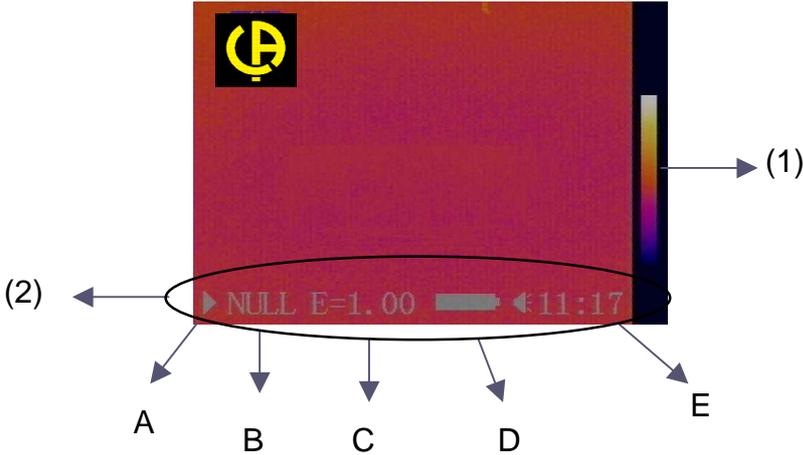
Press the ON/OFF switch for several seconds to power up the IR camera.

After 30 seconds, the CHAUVIN ARNOUX logo is displayed in the top left-hand corner of the screen, while the temperature colour bar is displayed on the right and a status bar is displayed at the foot of the screen.

Remove the lens cap and point at the target: an infrared image will appear on the screen.

Warning: do not point the IR camera at the sun or any other radiometric source for too long to avoid damaging the detector.

5.3 Description of Display Bars



- (1) Colour scale bar
The pseudocolours and colour scale are displayed on the right. The central band of colour shows the pseudocolours.

(2) Status bar

The status bar is displayed at the bottom of the screen, as shown in the illustration. From left to right:

A : "▷": dynamic mode
"□□": freeze mode

B : Operating mode. Various modes are possible:

- "NULL": no current function. Idle.
- "MENU": camera in Menu mode.
- "SP1": camera in "Spot 1" Analysis mode. It is possible to move the cursor around on the IR image (ditto for SP2 and SP3).
- "ISO": isotherm analysis mode. It is possible to change or move the isotherm range.
- "CAP.": automatic hottest/coldest spot detection mode. It is then possible to change the area of the max/min temperature tracking spot.

To return to NULL mode and stop the current analysis, simply press the "C" key. When you press this key, only the current analysis is cleared. To clear everything, go into the ANALYSIS menu and select "Remove All".

To return to the previous analysis mode or change to a different mode, you must select the required mode in the menu.

C : Emissivity of the target
The value displayed corresponds to the value entered in the menu.

D : Battery charge status

E : Time

5.4 Adjustment of the Camera

5.4.1 Adjustment of focus

Point the camera at the target and focus the image manually.

5.4.2 Adjustment of image (in "Null" and "Menu" modes)

In "Null" or "Menu" mode, press the "A" key: the RayCAM C.A 1884 will automatically optimize the image captured on the basis of the options selected in the Setup-Image submenu.

In other modes, if you need to make an adjustment without changing the analysis mode, press the "A" key: "Null" will then be displayed in the status bar. To adjust the image, press the "A" key again or adjust manually. If you want to adjust the image without keeping the current analysis mode, press the "C" key: the current analysis mode will be cleared and "Null" will be displayed in the status bar. To adjust the image, press the "A" key again or adjust manually.

5.4.3 Freeze and Live image (in all modes)

In the "live" mode, press the "S" key to freeze the image. Conversely, if you press the "S" key when in Freeze mode, the image will return to "Live" mode. This can be done in all the modes.

5.5 Implementation of the Instrument's Functions

5.5.1 Access to the menu

- (1) Press the MENU (ENTER) key: the Main Menu appears at the top of the screen.



- (2) Use the \triangle and ∇ direction keys to pull down the menu and move around inside it. To access a submenu, press the "ENTER" key.
- (3) When you have modified an option in the menu, press the "ENTER" key to confirm.
- (4) To exit from the MENU or to cancel a modification, press the "C" key to return to the previous menu. Press "C" until you exit from the "MENU" mode.

5.5.2 Temperature measurement

The RayCAM can simultaneously measure the temperature of 4 spots, tracking and displaying the highest/lowest temperature and alarm. The specific operation see follows.

- (1) Set "Analysis" Menu, Select "Setup Analysis" of "Setup" menu, and set as the following examples

Capture spot	: Maximum
Alert	: On
Temp alert	: 100°C
Correct temp	: 0°C
Isotherm width	: 0.7°C
Isotherm color	: Green
Isotherm alert	: 50°C
Laser Adjust	: On

- (2) Configuration of the "Obj. Par." submenu
Select this submenu and adapt the various values available to suit your requirements

Emiss	:	0.95
Distance	:	5 m
Temp Amb	:	25.0 °C
Humidity	:	50 %

- (3) Temperature measurement
Go into the "Analysis" menu, select one or more options among "Spot 1", "Spot 2" and "Spot 3". One or more cursors will then appear on the screen. At the same time, the temperatures corresponding to the cursors are indicated in the top right-hand corner of the screen. These spots can be moved around on the image by means of the direction keys. Automatic detection of the hottest/coldest spot corresponds to cursor 4 (SP4). The temperature value is also displayed in the top right-hand corner of the screen. If the temperature exceeds the preprogrammed temperature, the value is displayed in red and the camera sounds a buzzer: this is the thermal alarm function.

5.5.3 Isothermal analysis

- (1) Setup ► Analysis
Choose the "Isotherm type", "Isotherm width" and "Isotherm colour".
- (2) Analysis
Select "Isotherm" in the ANALYSIS menu and then press the MENU key. The RayCAM C.A 1884 will display the temperature range selected, based on the settings entered by the user. This makes the image clearer.
- (3) Moving the isothermal area and changing its size
In Isotherm Analysis mode, use the "▲" and "▼" keys to modify the size of the isotherm range and use the "►" and "◄" keys to change the area concerned.

5.6 Storage of Images and Inversion of Pseudocolours

- (1) Storing images
After adjusting an image, select "Save" in the FILE menu, and press the MENU key. The RayCAM C.A 1884 will then save the current image to the memory card (Note: this can be done in both Freeze and Live mode).
Another method involves pressing the "S" key for more than 2 seconds.
Description of storage procedure: the camera creates a folder and inserts the IR image into it.
- (2) Opening images
Make sure that the PC card already contains images.

Select "Open" in the FILE menu and press the MENU key. The message "Opening an image" is displayed on the screen along with the image name and the number of images saved on the PC card.

To select an image, press the "▲" or "▼" direction keys and then press the MENU key. The image is opened. Use the "◀" or "▶" direction keys to open the saved images one after the other.

(3) Deleting images

Select "Delete" in the "file" menu and then press the MENU (ENTER) key. Once you have done this, the procedure is the same as for opening an image. In this way, you can delete one of the current images.

(4) Pseudocolour shift

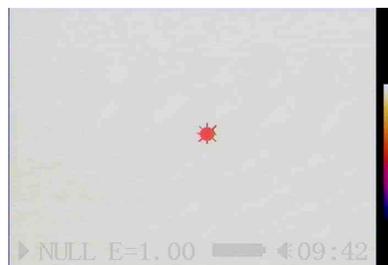
In the Setup menu, select "Other" and press the MENU (ENTER) key.

Select "Colour Scale" with "▲" and "▼", and then press "◀" and "▶" to shift the image colours.

5.7 Operation of the RayCAM C.A 1884 as a Thermometer

5.7.1 Laser pointer

The RayCAM C.A 1884 is equipped with a laser pointer function. When aiming at a target, the user can keep the trigger pressed to switch on a laser pointer.



Warning: do not point the laser at anyone's eyes.

5.7.2 Setting the laser pointer as the measuring instruction

The aim is to move the image of the laser pointer so that it matches up with cursor 1.

1. Go into the Menu ► Analysis ► Laser adjustment
Choose "ON" and press enter.

Capture spot :	Maximum
Alert :	On
Temp alert :	100°C
Correct temp :	0°C
Isotherm width:	0.7°C
Isotherm color :	Green
Isotherm alert :	50°C
Laser Adjust :	On

The information below will be displayed on the screen:

SP1:0C578

(This information corresponds to the current position of cursor 1).

2. Go to Analysis ► Spot 1
Press "ENTER" to activate cursor 1 and move it on the screen (SP1 is displayed in the status bar).
3. Move Spot 1 to where you wish to place the image of the laser pointer.
4. Go to Menu ► Analysis ► Laser Adjustment
Choose "OFF" and press ENTER.
You can then see that the image of the laser pointer has moved and is coordinated with cursor 1.



The temperature of the point aimed at by the laser pointer now corresponds to cursor 1.

5.8 RayCAM C.A 1884 power-saving mode

When the camera is not used for a certain time (defined by the user), the screen will automatically switch to standby. It can be reactivated by pressing any key.

6 RayCAM C.A 1884 BATTERY SYSTEM

The RayCAM C.A 1884 battery system comprises a rechargeable lithium battery and a charger.

6.1 Battery

The battery capacity of RayCAM C.A 1884 is 8.5 Wh. The system includes a circuit protecting against overvoltages and overheating. Each battery cell can be recharged at least 500 times. Each rechargeable battery has an operational charge life of 2 hours. When the battery is low, the camera will be switched off automatically to optimize safety.

6.2 Charger and Charging



Smart charger



Rechargeable lithium battery

- Connect the power cord located on the back of the charger to the electrical power source. The charger will automatically convert between 100-240 V. When the light comes on, it means that the charger is ready for use.
- Place the battery in the charger.

6.3 Additional Information

- Heat will be produced while charging.
- There is no risk of "overcharging" or damage for a full battery, but it is still recommended not to charge for longer than 20 hours.
- A new lithium cell will reach its full capacity after 5 charge operations.
- Unlike nickel-cadmium batteries, lithium batteries do not need to be fully discharged because there is no "memory effect".
- A 10 mA current persists when the camera is off. You can in this case disconnect the battery to prevent its discharging.

6.4 Precautions for Use

- There is a risk of explosion if the battery is replaced incorrectly.
- Only replace the batteries with batteries of the same type or a type recommended by the manufacturer.
- When the batteries are no longer fit for use, they must be disposed of as specified by the manufacturer.

6.5 Use of an External Power Supply

- When you use the RayCAm C.A 1884, the camera will shut down automatically when the battery is empty. If the user wants to connect the camera to an external power supply, the battery must be removed beforehand. If not, the camera will not start up because of the protection system.

7 INFRARED CAMERA MAINTENANCE

7.1 Routine maintenance

7.1.1 Lens and screen

The lens cap must be put back in place each time after using the camera in order to protect the lens against contact with dust or accidental damage. When the lens needs to be cleaned, please wipe it with a special lens tissue. Do not wipe it with your hand or the image quality will be affected.

7.1.2 Camera body

Take care not to drop the camera. After using the camera outside, carefully wipe the camera to avoid dust deposits and infiltration by liquids. Store the camera in its protective case.

7.2 Storage and Transportation

7.2.1 Storage

Do not store in a humid, dusty or insufficiently-ventilated place. Do not place it too close to a high-temperature heat source to prevent damage or distortion of the instrument.

7.2.2 Transportation

To prevent damage to the camera's components when moving or transporting it, avoid any shocks or vibrations.

8 TECHNICAL SPECIFICATIONS OF THE RayCAM C.A 1884

Environmental requirements for operation		
1	Operating temperature	-15 °C ~ +50 °C
2	Relative humidity	10 – 95 %
3	Storage temperature	-40 °C ~ +70 °C
Technical specifications of the RayCAM C.A 1884		
4	Type of Detector	Uncooled focal plane
5	Spectral response	8 ~ 14µm
6	Weight	≤0.7 kg (including battery)
7	NETD	0.1 °C
8	Temperature range	-20 ~ +250 °C
9	Temperature accuracy	±2 °C/±2 %
10	Battery operating time	Min. 2 h 30
11	Spatial resolution	2.2 mrad
12		
13	Image display and temperature measurement	Full-screen pseudocolours and full-screen temperature measurement
14	Structure	Integrated design and one-handed operation
15	Frame frequency/ output mode	50 Hz, PAL/NTSC as required
16	Packaging	High-strength plastic portable case
17	Shock resistance	25 G as per IEC 68-2-29
18	Vibration resistance	2 G as per IEC 68-2-6
19	Protection rating	IP 54 as per IEC 529
Temperature measurement functions		
20	Operation	Specially-designed Windows-style menus using control keys
21	Adjustment	Automatic adjustment of measurement ranges, brightness and contrast, electrically-controlled focus adjustment, automatic / manual colour adjustment
22	Spot temperature measurement	Display of temperature at the position of the cross-shaped cursor, simultaneous temperature measurement of 4 separate spots
23	Auto-tracking of max and min temperatures	Automatic tracking of the coldest/hottest spots in the image over an adjustable area
24	Isothermal analysis	Display of isothermal areas in the image
25	Automatic spot temperature alarm	Set the alarm to a given temperature: if this value is exceeded, a buzzer will sound

26	Automatic alarm on isothermal area	Set the alarm to a given temperature in the isothermal area and select the sensitivity: if this value is exceeded, the display colour will change and a buzzer will sound
27	Analysis function	When the user opens an image, it will be displayed with the analytical details linked to it when it was saved
28	Operation mode	When the user switches the camera on, it will show the last current analytical details (from when it was switched off)
29	Power-saving mode	Adjustment of automatic shutdown and standby mode
30	Image storage	Built-in 128 MB PC memory card capable of storing 1,000 thermal images
31	USB	The infrared images can be transferred directly via a USB port

9 RayCAM C.A 1884 SHORTCUT KEYS

1. "A" can be used to cancel any analysis or to perform auto-adjustment when not in Analysis mode.
2. "S" : freezes or unfreezes (Live) the IR image. By keeping it pressed down for longer, it can be used to save an IR image.
3. "◀" / "▶" : in non-menu mode, these keys can adjust the contrast (level) of the image.
4. "▲" / "▼": in non-menu mode, these keys can be used to adjust the brightness (span) of the image.
5. "C"+"S": in non-menu mode, this key combination can be used to activate/deactivate the buzzer.
6. "C"+"▲" / "▼": in non-menu mode, this key combination can be used to adjust the brightness of the LCD screen.
7. "C"+"◀" / "▶": In non-menu mode, this key combination can be used to adjust the contrast of the LCD screen.
8. "C"+ menu key + "▲" / "▼": In non-menu mode, this key combination can be used to adjust the colour level on the LCD screen.
9. Press the "C" key before switching on the camera to reset the system parameters with the default values. ^(Note 1)
10. In "NULL" mode, "C"+"A"+"S" will reset the file name and folder name to 0. ^(Note 2)
11. When the RayCAM C.A 1884 is connected to a PC, the user can copy, erase and format memory card via the PC. ^(Note 3)

Note 1: This can be used to reset the camera if it does not work because of the system parameters defined.

Note 2: Delete all the files in the camera before initializing the file name.

Note 3: FAT 16 is selected when formatting the file system.

EMISSIVITY

Emissivity of Various Materials

Material	Temperature (°C)	Approximate emissivity
Metal		
Aluminium		
Polished aluminium	100	0.09
Commercial aluminium foil	100	0.09
Electrolytic chrome-plated alumina		0.55
Mild alumina	25 ~ 600	0.10 ~ 0.20
Strong alumina	25 ~ 600	0.30 ~ 0.40
Brass		
Polished brass	28	0.03
Oxidized brass	200 ~ 600	0.61 ~ 0.59
Chrome		
Polished chrome	40 ~ 1090	0.08 ~ 0.36
Copper		
Copper mirror	100	0.05
Strong copper oxide	25	0.078
Cuprous oxide	800 ~ 1100	0.66 ~ 0.54
Liquid copper	1080 ~ 1280	0.16 ~ 0.13
Gold		
Polished gold	230 ~ 630	0.02
Iron		
Polished cast iron	200	0.21
Processed cast iron	20	0.44
Polished tempered iron	40 ~ 250	0.28
Polished steel ingot	770 ~ 1040	0.52 ~ 0.56
Raw welded steel	945 ~ 1100	0.52 ~ 0.61
Surface ferric oxide		
Completely rusted surface	20	0.69
Rolled iron plate	22	0.66
Oxidized steel	100	0.74
Cast iron (oxidizing at 600 °C)	198 ~ 600	0.64 ~ 0.78
Steel (oxidizing at 600 °C)	198 ~ 600	0.79
Electrolytic ferric oxide		
Ferric oxide	125 ~ 520	0.78 ~ 0.82
Cast-iron ingot	500 ~ 1200	0.85 ~ 0.89
Iron plate	925 ~ 1120	0.87 ~ 0.95
Cast iron, heavy ferric oxide	25	0.80
Tempered iron, ferric oxide	40 ~ 250	0.95
Molten surface	22	0.94
Molten cast iron	1300 ~ 1400	0.29

Molten mild steel	1600 ~ 1800	0.28
Liquid steel	1500 ~ 1650	0.42 ~ 0.53
Pure liquid iron	1515 ~ 1680	0.42 ~ 0.45
Lead		
Pure lead (non-oxidized)	125 ~ 225	0.06 ~ 0.08
Slightly oxidized	25 ~ 300	0.20 ~ 0.45
Magnesium		
Magnesium oxide	275 ~ 825	0.55 ~ 0.20
Magnesium oxide	900 ~ 1670	0.20
Mercury	0 ~ 100	0.09 ~ 0.12
Nickel		
Electroplate polishing	25	0.05
Electroplate without polishing	20	0.01
Nickel wire	185 ~ 1010	0.09 ~ 0.19
Nickel plate (oxidized)	198 ~ 600	0.37 ~ 0.48
Nickel oxide	650 ~ 1255	0.59 ~ 0.86
Nickel alloys		
Shiny nickel-chrome alloy wire (heat resistance)	50 ~ 1000	0.65 ~ 0.79
Nickel-chrome alloy	50 ~ 1040	0.64 ~ 0.76
Nickel-chrome (heat resistance)	50 ~ 500	0.95 ~ 0.98
Alloy wire (oxidized)		
Nickel-silver alloy	100	0.14
Silver		
Polished silver	100	0.05
Stainless steel		
18-8	25	0.16
304(8Cr, 18Ni)	215 ~ 490	0.44 ~ 0.36
310(25Cr,20Ni)	215 ~ 520	0.90 ~ 0.97
Tin		
Commercial tin plate	100	0.07
Highly-oxidized	0 ~ 200	0.60
Zinc		
Oxidizing at 400 °C	400	0.01
Commercial zinc plate	28	0.23
Grey oxidized zinc	25	0.28

Material	Temp (°C)	Approximate emissivity
Non-metallic materials		
Brick	1100	0.75
Refractory brick	1100	0.75
Graphite(lamp-black)	96 ~ 225	0.95
Enamelled porcelain (white)	18	0.90
Asphalt	0 ~ 200	0.85
Glass (surface)	23	0.94
Heat-resistant glass	200 ~ 540	0.85 ~ 0.95
Calcimine (whitewash)	20	0.90
Oak	20	0.90
Graphene		0.85
Insulating foil		0.91 ~ 0.94
Metal foil		0.88 ~ 0.90
Glass tube		0.90
Ceramic coil products		0.90
Porcelain mottling		0.83 ~ 0.95
Solid material		0.80 ~ 0.93
Capacitor		
Rotary		0.30 ~ 0.34
Chemical		0.25 ~ 0.36
Ceramic (flat)		0.90 ~ 0.94
Ceramic (vase)		0.90
Film		0.90 ~ 0.93
Mica		0.94 ~ 0.95
Mica pipe		0.90 ~ 0.93
Glass		0.91 ~ 0.92
Semi-conductors		
Transistor (plastic)		0.80 ~ 0.90
Transistor(metal)		0.30 ~ 0.40
Diode		0.89 ~ 0.90
Transmitting coil		
Pulse transmitter		0.91 ~ 0.92
Layer of white chalk		0.88 ~ 0.93
Upper loop		0.91 ~ 0.92

Electrical materials		0.86
Epoxy-glass plate		
Epoxy-hydroxybenzene plate		0.80
Gold-plated copper foil		0.30
Sodium-coated copper		0.35
Tin-coated lead wire		0.28
Brass wire		0.87 ~ 0.88
Talc connector		0.87

**Thank you for using the RayCAM C.A 1884 IR camera.
We appreciate you support and confidence.**

Product Warranty:

We guarantee that each RayCAM C.A 1884 IR camera complies with the corporate standards. We provide a one-year warranty starting on the date of delivery for any materials or process defects in the context of proper storage, operation and service. We will charge for any maintenance required due to damage resulting from improper use, negligence or accident.

10 TO ORDER

RayCAM CA 1884.....P01.6512.28

Spares and accessories

Battery.....P01.2960.41
USB cable.....P01.2952.74
Infrared lens cap.....P01.6515.22
Sunshield.....P01.6515.25
Tripod adapter.....P01.6515.26
External power supply.....P01.6515.27



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